Zambia

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ZAMBIA COUNTRY REPORT

FOR USE IN RADIOLOGY OUTREACH INITIATIVES

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General Country Profile

A. Geography and Population

Figure 1: Map

Zambia is a landlocked country in southern Africa, located east of Angola and south of the Democratic Republic of the Congo. Other bordering countries include Malawi, Mozambique, Namibia, Tanzania, and Zimbabwe. Slightly larger than the state of Texas, it's total area equals 752, 618 square kilometers. [1] The largest city is the capital, Lusaka, located in the province of Lusaka. Other major cities, Ndola and Kitwe, are located in the Copperbelt province. There are 10 provinces in Zambia: Central, Copperbelt, Eastern, Luapula, Lusaka, Muchinga, Northern, North Western, Southern, and Western. [2]

Zambia's climate is tropical, with a terrain of mostly high plateaus with some hills and mountains. The rainy season lasts from October to April, with a risk of tropical storms from November to April and a periodic drought. Notable geographic features include the Zambezi River, which forms a boundary with Zimbabwe. On this border exists Lake Kariba, the world's largest reservoir by volume, and Victoria Falls, one of the world's largest waterfalls. [1]

The population of Zambia in July of 2014 was 14, 638, 505, ranking the 71st highest in the world. [1] In 2012, 46.73% of the population was under 15 years of age, while 3.95% of the population was over 60. [3] However, the population growth rate is ranked 16th highest in the world, at 2.88%. Ranked even higher is the birth rate, at 4th in the world, with 41.46 births per 1,000 people. [1] In 2010, the Central Statistical Office of Zambia found that 60% of the population lived in rural areas. The average household size was 5.2 persons. [2] In 2014, the median age was 16.7 years. [1] The literacy rate for ages 15+, in 2010, was 71.2%. The human development index score, out of 186 countries, is 163. [3] Population data for Zambia in 2010 can be seen in Figures 3 and 4. Figure 5 displays the total population by province in 2010.

Figure 3: Population, Age,and Sex Structure, Zambia Total, 2010

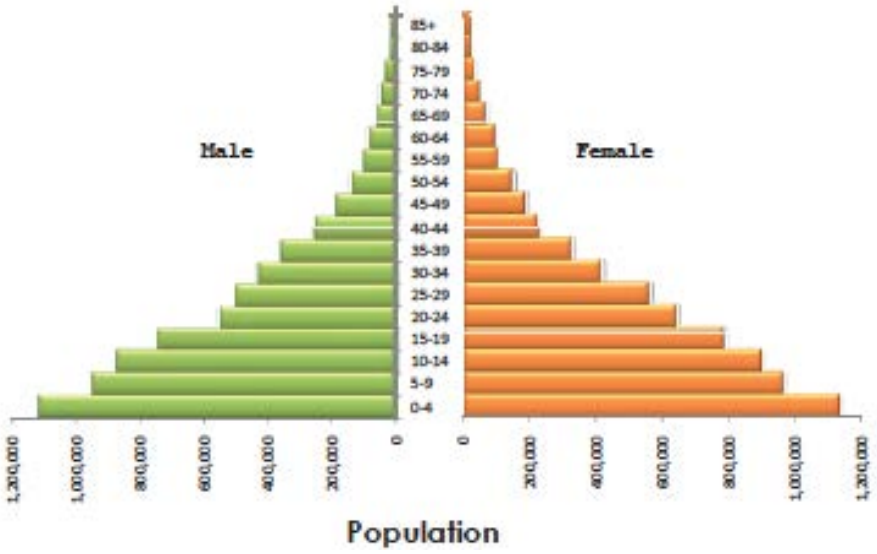
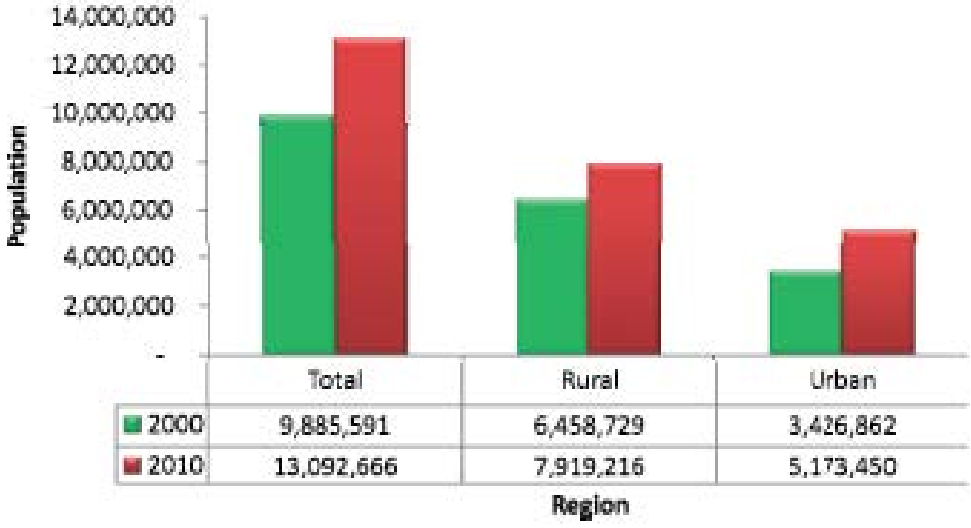


Figure 4: Trends in Population, Zambia Total and Region, 2000-2010



B. Culture and History

English is the official language. However, there is said to be over 70 languages spoken across the country. Although many may be considered dialects, all of Zambia's major languages are related to Bantu. Bemba is the second most common language spoken, by 2 million Zambians in the capital Lusaka and throughout the Copperbelt. There are six other common languages, dominant in different regions. Nyanja and Chewa are used across the country, while Kaonde, Luvale, and Lunda are used in the west. Tonga is spoken in the south and Lozi near the Zambezi River. [4] The number of ethnic groups in Zambia is also large. The Bemba people make up 21% of the population, with the Nyanja comprising 14.7%, and the Tonga 11.4%. The rest of the population is comprised of Chewa, Loze, Nsenga, Tumuka, and many more. Even with a wide variety of languages and ethnicities, 73% of the population identifies as Protestant, 20.2% as Roman Catholic, and 4.5% as other or none. [1]

As the majority of the population is Protestant, Christian holidays are part of religious celebrations, but traditional ceremonies are still held in various regions. There are ceremonies to mark when children become adults, to commemorate a season, give thanks, or mark a historical event. The most famous traditional ceremony is the 300-year-old Kuomboka, when the Lozi people travel in boats on the Zambezi River for a ceremonial trip away from annual floods. Kuomboka translates to "get out of the water onto dry grounds". [4]

Mary Furlong, a retired teacher and debate coach, who has worked as teacher trainer and program coordinator for HIV/AIDS in Zambia says, "traditional medicine was the norm in Kabwe. In Lusaka compounds, traditional medicine would be used first by our community school teachers and their families. Only if more serious health issues occurred would they go to the local clinics…location, cost being the determining factors. Rural areas would get maybe a nurse once every two weeks, clinical officers, with little training were the front line medical staff in those rural areas (not the cities) so traditional medicines were preferred." [19]

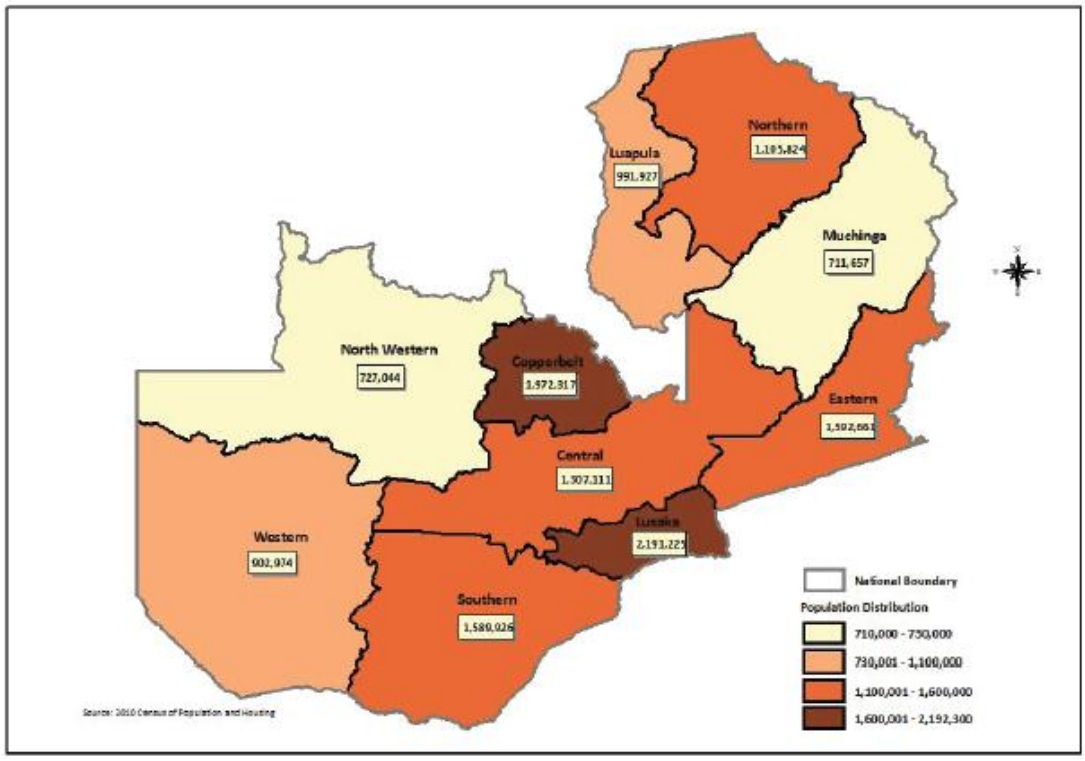
In contrast to the United States, Zambian society is much less hurried. Zambians always greet each other formally before every conversation. Usually "good morning" or "good afternoon" is followed by "how are you?" and "I am fine, thank you." [4]

Symbols of national identity include the flag, national anthem, and Independence Day. The colors on the national flag represent different things- black for the people, red for the struggle for freedom, orange for mineral wealth, green for land and natural resources, and the eagle for freedom that exists in Zambia and the ability to solve internal problems. The national anthem is sung at all official events, public meetings, assemblies, and sporting contests. The tune comes from a song entitled "*Nkosi Sikelele Africa*", which translates to God bless Africa. Independence Day is celebrated each year on October 24th. [5]

Zambia started as the territory of Northern Rhodesia, until it was taken over by the UK in 1923. Advances in mining in the 1920's and 1930's prompted development and immigration. The nation gained independence in 1964, led by Kenneth Kaunda, and took on the name of Zambia. In the 1980's and 1990's, the economy was hurt by economic mismanagement and prolonged drought. One party rule was brought to an end by multi-party democratic elections in 1991. [1] Since then, there have been only minor political controversies. Zambia, unlike its surrounding neighbors, has been relatively stable and

enjoyed peace and prosperity. It supported freedom fighters from Rhodesia (now independent Zimbabwe) during their struggle for independence in the 1970s. Since its independence, Zambia has remained under civilian rule and succession of political power. [6]

Figure 5: Total Population by Province, Zambia 2010



C. Economy and Employment

Zambia's major industries include copper and emerald mining, construction, foodstuffs, beverages, chemicals, textiles, fertilizers, and horticulture. [1] The unemployment rate in 2007 was 14%. [1], and the annual inflation rate was 7.1% in 2013. [1] Zambia's economy has been steadily improving since 2005, with the GDP growing over 6% each year. In the 1990's, the government owned copper industry became privatized, and copper output has been increasing since 2004. Zambia's strong dependence on copper makes it vulnerable to depressed commodity prices, but recent high copper prices, along with a strong maize (corn) crop allowed Zambia to quickly recover from the 2008 world economic slowdown. Furthermore, recent regulatory changes have improved Zambia's ease of doing business. Despite the strong economy, poverty is still widespread across the nation. [1]

According to The World Bank, Zambia received $957,720,000 U.S. dollars in net official development assistance and official aid, ranking 35th in the world. [7] Zambia's gross national income (GNI) in 2013 was 21,544,481,894 U.S. dollars, while the GNI per capita in 2013 was 1,480 in U.S. dollars. The gross domestic product in 2013 was 22,383,715,315 U.S. dollars. [7] Imports of goods and services made up 48% of the GDP in 2013. The World Bank indicated Zambia's "ease of doing business" at 107 in 2013, and 111 in 2014. By this

indicator, 1 equals the most business friendly regulations. For comparison, the average of all countries would have ranked at 95 in 2014. [7]

D. Government and Legal System

Zambia's type of government is a republic. Independence was gained from the UK on October 24th, 1964. The latest constitution was adopted in 1991 and amended in 1996. Minor controversy accompanied the vote in 1996, which saw blatant harassment of opposition parties. The 2001 election had administrative problems with three parties filing a legal petition challenging the election of ruling party candidate Levy Mwanawasa. However, Mwanawasa was reelected in 2006 in an election that was judged free and fair. In August of 2008, he died suddenly and was succeeded by his vice president, Rupiah Banda. Banda later became president by election in October 2008. Michael Chilufya Sata was elected president in September 2011, but died in office in 2014. [1] The acting president was the then vice president Guy Scott; the newly elected president is Edgar Lungu. [4]

In late 2013, a constitution committee submitted a draft constitution to the government, but the government has yet to release a final copy or plan to adopt the document. The legal system is a mix of English common law with judicial review of legislative acts in an ad hoc constitutional council. The government has executive, legislative, and judicial branches. Within the executive branch, the chief of state and head of government is the president. Underneath the president is the vice president. The president appoints the vice president, a cabinet from members of the National assembly, and 8 unelected members. President is elected for a five-year term by popular vote and is eligible for a second term. The legislative branch is comprised a unicameral National assembly, where 150 of 158 members are elected by popular vote. The judicial branch has a Supreme Court comprised of 9 judges. [1]

E. Physical/Technological Infrastructure

According to the CIA World Factbook, Zambia's telephone system is among the best in sub-Saharan Africa. While there are only 82,500 main telephone lines in use, as of 2012 there are 10.525 million mobile cellular phones in use. Satellites are being installed to improve phone service in rural areas, and Internet service is available, although sparsely. [1] Between 2010-2014, an average of 15.4 people out of every 100 people in Zambia had Internet access, but 72 out of 100 people had a mobile cellular phone. [7] Zambia produces 11.19 billion kWh and consumes 7.96 billion kWh of electricity. Of this, 99.6% is from hydroelectric plants. Alternative and nuclear energy, including hydropower, geothermal, and solar power, made up 11.6% of Zambia's total energy use in 2011. [7] Zambia is home to airports, railways, roadways, and waterways. There are 88 airports, 8 of which have paved runways. Paved roadways for motor vehicles make up 9,403 km of a total of 67,671 km. [1] Less than half the roads are tarred or graveled, and most of the roads have many potholes. [4] Buses and coaches offer transport between major towns, while minibuses and taxis, which are painted blue, can give local rides. If traveling across the country via vehicle, a 4 by 4 is recommended.

Zambia's long-term development strategy is outlined in "Vision 2030: A prosperous middle-income nation by 2030". This document, by the Government of the Republic of Zambia, articulates a series of national development plans. The most current national

development plan is the Sixth National Development plan, encompassing 2011-2015. The three principal objectives are infrastructure development, rural development, and human development. More specific objectives include reducing national poverty and income inequities, increasing access to safe potable water, increasing access to education, and equitable access to health care. [6]

National Health Care Sector Review

A. National Health Care Profile

As with many sub-Saharan African nations, Zambia is faced with many challenging threats to public health. Threats to public health include infectious diseases, cancers, and acute and chronic illnesses. The communicable diseases that are most prevalent are HIV/AIDS, tuberculosis, malaria, and STI's. The country is also challenged by a high burden of maternal, neonatal, and child health problems, in addition to the growing number of non-communicable diseases. These include mental health, cancers, sickle cell anemia, diabetes, heart disease, eye problems, malnutrition and respiratory disease.

The risk for infectious diseases is very high, and the HIV/AIDS prevalence rate in Zambia ranks 7th highest in the world. [1]. Recent strides have been made in improving the country's health status, but plenty of challenges remain. Much of this has to do with Zambia's high poverty level, which was at 67% in 2006.

Health Status Indicators

In 2012, the life expectancy at birth averaged 57 years, with 58 for female and 55 for male. Between the years 2000 and 2012, life expectancy increased from 50 to 57 years. Infant mortality has decreased from 95 deaths per 1000 live births in 2001, to 70 deaths per 1000 live births in 2007 and is projected to continue to decrease. The neonatal mortality rate has decreased, while the maternal mortality ratio improved. However, the HIV/AIDS prevalence rate, number of TB patients, and number of malaria cases has been increasing. In Zambia, unfortunately most childhood deaths are from preventable diseases such as diarrhea, malaria, pneumonia, HIV/AIDS, and malnutrition. According to the WHO, in 2008, the two highest causes of morbidity, mortality, and visitation to health facilities were malaria and non-pneumonia respiratory infections. [8]

Figure 6: Main Causes of Morbidity and Mortality in Zambia: Top 10 Diseases, 2008 & 2009

Diagnosis	Year	Incidence per 1,000 pop. (Morbidity)	Total diagnosis	Inpatient deaths (Mortality)
Malaria	2008	75.0	957,878	1,072
	2009	44.7	592,558	1,181
Respiratory Infection (non-Pneumonia)	2008	51.3	658,175	213
	2009	108.0	1,430,505	321
Diarrhoea: Non Bloody	2008	17.4	224,207	468
	2009	30.0	397,555	798
Trauma: Accidents, wounds, burns	2008	12.4	158,895	192
	2009	22.6	298,818	267
Respiratory Infection (Pneumonia)	2008	8.3	107,024	682
	2009	14.3	190,121	1,225
Skin Infection	2008	8.7	111,465	69
	2009	8.5	112,188	13
Muscular Skeletal & Connective Tissues	2008	8.4	108,756	12
	2009	18.2	241,170	31
Digestive system (non infectious)	2008	6.8	87,664	143
	2009	13.1	173,395	259
Anaemia	2008	2.4	30,738	467
	2009	5.9	78,102	1,003

Figure 7: 10 Major Causes of Visitation to Health Facilities, all ages, Zambia, 2006-2008

Ranking	2006 (All ages)		2007 (All ages)		2008 (All ages)	
	Disease Name	Incidence per 1,000 pop.[1]	Disease Name	Incidence per 1,000 pop.[2]	Disease Name	Incidence per 1,000 pop[1]
1	Malaria	412	Malaria	359	Malaria	251.7
2	Respiratory infection: non-pneumonia	192	Respiratory infection: non-pneumonia	219	Respiratory infection: non-pneumonia	197.6
3	Diarrhoea: non-bloody	81	Diarrhoea: non-bloody	76	Diarrhoea: non-bloody	69.3
4	Trauma[3]	48	Trauma[2]	50	Trauma[2]	46.6
5	Eye infection	41	Skin infections	38	Skin infections	38
6	Skin infections	41	Respiratory infections: pneumonia	37	Muscular skeletal &connective tissue	32.3
7	Respiratory Infections: pneumonia	39	Eye infection	35	Eye infection	31.3
8	Ear/Nose/throat infections	26	Muscular skeletal &connective tissue	30	Respiratory infections: pneumonia	30.8
9	Intestinal worms	16	Digestive system not infectious	27	Skin infections	30.5
10	Sexually transmitted infections	14	Ear/Nose/throat infections	26	Ear/Nose/throat infections	26.9

Source: Zambia: Ministry of Health 2008 Statistical Bulletin

Maternal, Adolescent, and Childhood Health

The burden of maternal and under-five illnesses and deaths are an important indicator of Zambia's socioeconomic and health development. Even though the maternal mortality ratio has decreased from 729/100,000 live births in 2000 to 449/100,000 live births in 2007, Zambia maintains one of the highest maternal mortality ratios in the region. Leading causes of maternal mortality include abortion, injuries, obstructed labor and septicemia. Choice of delivery is affected by many factors, such as distance to the closest health facility, traditional beliefs, or inadequate infrastructure or supplies. The percentage of births attended by skilled health workers in 2007 was 46.5%.[8] Interventions that have been successful and need to be increased include improved use of contraception, improved referral systems and access to emergency obstetric care, as well as investing in mother's education and nutritional status.[9]

The adolescent population in Zambia, as in many countries, is prone to risky behavior. Problems include the prevalence of HIV/AIDS, early pregnancy, alcohol abuse, and STI's.

The main causes of childhood morbidity and mortality are consistent—malaria, respiratory infections, diarrhea, malnutrition, and anemia. [8] The under 5-mortality rate as of 2012, according to the WHO, was 89/1000 live births, while the neonatal mortality rate was 29/1000 live births. Fifteen percent of children in the country are underweight, while 45% are stunted. [3] Many of these statistics result from micronutrient deficiencies, such as Vitamin A deficiency. Another health problem for children in Zambia is mother-to-child transmission of HIV. This is the most common source of infection in children below age 5. [8] Since 1992, the child mortality rate has decreased by about 30 percent, and this progress has been a result of increases in immunization coverage, exclusive breast-feeding, vitamin and mineral supplementation, and malaria prevention and treatment. However, these interventions still need to increase because the rates are still high.

Disease Burden

As previously mentioned, HIV/AIDS, Tuberculosis, and Malaria remain the top three infectious diseases in Zambia.

It is estimated that there are about 1.3 million people in Zambia living with HIV/AIDS, or 14% of the country's population. Data indicates that 7.7% of these are young people between ages 15 and 24. Women are more affected than men, being 1.3 times more likely to be living with HIV. Also, HIV is twice as common in urban areas than in rural areas. [10] Figure 8 shows the HIV prevalence rate in 2002 and 2007, as well as data on the percentage of 15-24 year olds in Zambia with comprehensive, correct knowledge of HIV/AIDS.

Figure 8: HIV Prevalence Rate in Zambia

	2000	2002	2005	2007	2008	2009	2011
HIV prevalence rate (%)		15.6		14.3			
Proportion of 15-24-year-olds with comprehensive, correct knowledge of HIV&AIDS (%)		31	43.7*	48		40.2*	
Ratio of school attendance of orphans to non-orphans (10-14 years) (%)	71.8	79.1		93		92*	
Proportion of population with advanced HIV infection on ART (%)			23.5‡		74‡		77.6‡

Sources: CSO, except *Zambia Sexual Behaviour Survey 2009 and ‡HIV&AIDS UNGASS Zambia Report 2012

Malaria is the final major communicable disease burdening Zambia. It most negatively impacts children under age 5, and pregnant women, as it makes up 40% of child deaths and 20% of maternal mortality. There is a national malaria control program working to reduce these statistics. [11] Malaria incidence has been slowly decreasing, from 383 cases per 1000 people in 2005 to 246 per 1000 in 2010. [10] Despite the decreases in these disease incidence rates, the prevailing rates are still unacceptably high and a major

concern of the Zambian health sector. Figure 9 demonstrates the rise and decline in the number of malaria cases per 1,000 population from 1990-2010.

Figure 9: Malaria Data in Zambia

	1990	2000	2002	2003	2004	2006	2007	2008	2009	2010
New malaria cases per 1,000 population	255	316	388	425	383	412	358	252	246	330
Malaria fatality rate per 1,000 population	11		48		33	40	40	39	29	34
Proportion of households with ITNs (pre- or post-treated) (percent)		9.3*	13.6			37.8	53.3	62.3		64.3

Sources: MOH, except *Netmark Baseline Survey on Insecticide Treated Materials in Zambia, May 2001

The number of tuberculosis cases in Zambia has been slowly rising, but control efforts are showing results. In 2004, there were 545 new TB cases per 100,000 people, which fell to 372 cases per 100,000 people in 2011. The number of TB cases may coincide with the prevalence of HIV. It is estimated that around 65% of patients infected with TB are also infected with HIV. This presents many challenges for treatment strategies. [11]

Other communicable diseases prevalent in Zambia are infectious and parasitic diseases; such as schistosomiasis, trypanosomiasis, and leprosy. [11]

Non-Communicable disease

Like many other countries across the globe, Zambia is experiencing an increase in non-communicable diseases. Specifically, hypertension, cardiovascular diseases, diabetes, cancer, and road traffic accidents are increasing. Road traffic accidents have been an ongoing problem for many years in Zambia. Almost 1300 road traffic accidents occurred just in 2007, and trauma is a leading cause of mortality for the country. [11]

The WHO Country Cooperation Strategy Brief lists these key interventions in Zambia, which result from the World Health Assembly and Regional Committee policy documents, strategies and resolutions. Specifically, they are: the Implementation of the International Health Regulations, Global Immunization Vision and Strategy, WHO HIV/AIDS Strategy 2011-2015, Cholera- Mechanism for Control and Prevention; Infant and Young Child- Nutrition Implementation Plan; the Measles elimination strategy; the Framework for Public Health Adaptation to climate change in the African region; the Framework for African Public Health Emergency Fund; Poliomyelitis eradiation in the African Region; Disaster Risk Management- a Strategy for the African Region; the Roadmap for scaling up human resources for health for improved health service delivery in the African Region 2012-2025; the Health Promotion Strategy for the African Region, and many others. [3]

B. National Health Care Structure

When the socialist era ended in Zambia in 1991, the Government of Zambia developed more complex mechanisms of leadership and government. That year, the National Health Policies and Strategies were published, marking the beginning of healthcare reform in the country. Reforms included a decentralization policy, introducing a Basic Health Care Package, and the steps of Sector Wide Approaches in coordination with cooperating partners. Currently, existing policy, goals, and strategies for Zambian healthcare service delivery can be found in the Fifth National Development Plan, the National Health Strategic Plan, Millennium Development goals, Poverty Reduction Strategy Paper, and Vision 2030. [11]

WHO Africa outlines some general strengths, weaknesses, and recommendations of the Zambian healthcare system.

Strengths	Weaknesses	Recommendations
-Strong political will and commitment -Clear and limited mandate of the Ministry of Health to provide oversight -Leadership structures are in place -Fiduciary responsibility over financial and other resources have been enhanced -Partners goodwill improved institutional capacity at all levels to provide oversight -Existing of policy and strategic environment to support service delivery	-Policies are largely donor influenced -Lack of policy direction with the existing policy on secondary and tertiary services delivery management -Weak documentation of the definition of the scope of the health sector -Long term reliance on vertical programs -Inadequate human resources -Inadequate oversight and quality assurance -Limited implementation of policy -Poor compliance with government regulations	-Revamp leadership management training Ministry of Health staff at appropriate level -Induction of health workers must be enhanced with regulations/guidelines -Annual performance appraisal system -New engagement framework with cooperating partners and Central Statistical Office -Strengthen secondary and tertiary health service management -Promote integration of programs -Revise national policy

Leadership

The Zambia Ministry of Health is responsible for the coordination, organization, and management of the health sector in Zambia. The headquarters is located in Lusaka, and there are offices at the Provincial, District, and Community levels as well. [10]

Facilities

The following chart is from the 2012 List of Health Facilities in Zambia by the Zambia Ministry of Health, summarizing all of the health facilities in Zambia by province. In

total, there were 1,956 health facilities in Zambia. Lusaka, a more urban province where the capital is located, contained the highest number of facilities with 294. Coming in second was the Southern province with 253, and third was the Copperbelt province with 250. The province with the least number of facilities, 99, was the Muchinga province. This is the newest province to be created in Zambia. [12]

Figure 10: Summary Statistics on Key Health Services Offered by Province, Zambia 2012

No.	District name	No. of HF by levels of care						
		No. of TLH	No. of SLH	No. of FLH	No. of UHCs	No. of RHCs	No. of HPs	Total HFs
1	Central	0	2	8	29	129	36	204
2	Copperbelt	3	4	11	148	55	29	250
3	Eastern	0	2	7	5	143	49	206
4	Luapula	0	1	6	3	125	10	145
5	Lusaka	3	1	15	182	51	42	294
6	Muchinga	0	1	4	4	69	21	99
7	Northern	0	2	2	8	102	34	148
8	North-Western	0	1	10	6	135	11	163
9	Southern	0	4	11	19	178	41	253
10	Western	0	1	10	5	144	34	194
Zambia		6	19	84	409	1,131	307	1,956

No.	District name	No. of HF by ownership				No. of beds & cots	
		No. of GRZ HFs	No. of Mission HFs	No. of Private HFs	Total HFs	Number of beds	Number of cots
1	Central	185	9	10	204	1,984	195
2	Copperbelt	172	10	68	250	4,560	734
3	Eastern	193	13	0	206	3,216	309
4	Luapula	138	6	1	145	1,818	290
5	Lusaka	126	13	155	294	2,942	537
6	Muchinga	89	7	3	99	1,194	90
7	Northern	139	6	3	148	1860	133
8	North-Western	143	18	2	163	2,696	227
9	Southern	227	18	8	253	3,400	652
10	Western	178	16	0	194	2,136	279
Zambia		1,590	116	250	1,956	25,806	3,446

TLH	SLH	FLH	UHC	RHC	HP
Third Level Hospital	Second Level Hospital	First Level Hospital	Urban Health Center	Rural Health Center	Health Post

Figure 11: Summary Background Statistics For Health Facilities by Province, Zambia, 2012

No.	District name	Proportion of services offered					
		HCT*	PMCTC*	MC*	Delivery site	TB Diagnostic site	*EMOC Site
1	Central	93	87	8	78	23	36
2	Copperbelt	94	81	32	63	40	17
3	Eastern	96	97	10	82	33	32
4	Luapula	96	95	8	92	14	44
5	Lusaka	74	65	17	46	16	10
6	Muchinga	67	79	9	86	15	18
7	Northern	87	75	6	90	11	10
8	North-Western	49	67	21	69	17	22
9	Southern	99	93	9	82	19	30
10	Western	93	94	6	89	41	21
	Zambia (% Total)	85	83	12	78	23	24

No.	District name	Lab services	Dental services	X-Ray services	CD4 machine	Theater	MWS*
1	Central	29	6	7	14	6	15
2	Copperbelt	28	11	9	17	10	5
3	Eastern	33	6	5	9	5	15
4	Luapula	17	2	4	11	4	5
5	Lusaka	17	6	6	8	2	11
6	Muchinga	20	6	6	10	6	25
7	Northern	19	12	4	6	4	9
8	North-Western	19	11	10	14	11	15
9	Southern	32	7	6	10	7	22
10	Western	33	3	5	6	6	48
	Zambia (% Total)	25	7	6	11	6	17

HCT	PMTCT	MC	EMOC	MWS
HIV Counseling & Testing	Prevention of Mother to Child Transmission	Male Circumcision	Emergency Obstetric Care	Mother Waiting Shelter

The Zambian healthcare system is made up of 5 levels. [12]

Third level hospitals, also known as *Specialist* or *Tertiary,* are the highest level of referral and serve about 800,000 people. They offer sub-specializations in internal medicine, surgery, pediatrics, obstetrics, gynecology, intensive care, psychiatry, as well as training and research. Referrals are sent by second level hospitals. [12]

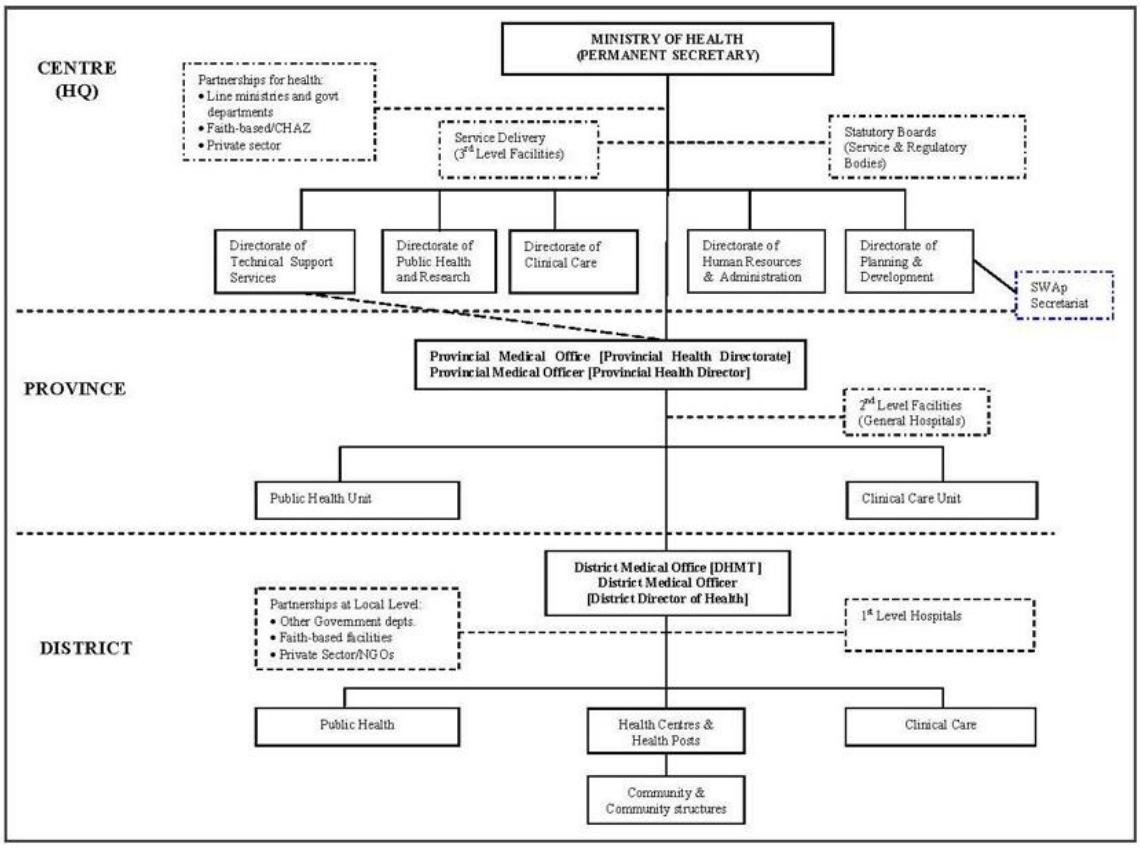
Second level hospitals, also known as *Provincial* or *General Hospitals*, are intended to serve between 200,000 and 800,000 people. Services include internal medicine, general surgery, pediatrics, obstetrics, gynecology, dental, psychiatry, and intensive care. Patients here are referred from a first level hospital. [12]

First level hospitals, also known as District hospitals, cater to a population between 20,000 and 80,000, and offer services such as medical, surgical, obstetric, and diagnostic exams. Patients here are referred from a health center.

Health centers in Zambia can be one of two types, either an Urban Health Center/clinic, which serves between 30,000 to 50,000 people, or a Rural Health Center, which serves around 10,000 people. [12]

The lowest level of health care in Zambia is at a Health Post. Located in communities away from health centers, they serve around 3,500 people in rural areas, but anywhere between 1,000-7,000 people in urban. They are located within a 5-kilometer radius for areas with sparse population. The services at these posts are not curative, but rather basic first aid. [12]

Figure 12: Operational Chart of the Public Health System: Central, Provincial, & District Level



Of these facilities, 88% are government owned, 13% are privately owned, and 6% are owned by faith-based organizations, such as the Churches Health Association of Zambia (CHAZ). The majority of these facilities are rural health centers, making up 58% of the total with 1,131. Urban health centers only make up 23%, with 409 facilities. In terms of the levels, in 2012 there were 6 third level health facilities, 19 second level, and 84 first level hospitals. Amongst all health facilities, 25,806 beds and 3,445 cots were recorded. [12]

Figure 13: Summary Statistics on the Main Communication Mode, Source of Power, water, & SMARTCARE services by Province, Zambia, 2012

No.	Facility Name	Proportion of the main communication mode (%)		Proportion of the main source of power the health facility uses (%)			Proportion of the water source – (%) 500m radius from HF			
		Radio system	Telephone network	Hydro	Gen.set	Solar	Piped water	Boreholes	Protected dug well	Unprotected dug well
1	Central	27	84	50	4	44	41	71	46	13
2	Copperbelt	18	77	78	5	6	67	48	3	0
3	Eastern	65	65	24	7	40	19	78	3	0
4	Luapula	37	72	48	3	21	14	75	22	6
5	Lusaka	20	77	74	21	28	48	59	0	0
6	Muchinga	53	79	25	9	45	21	35	37	2
7	Northern	36	65	21	5	66	16	44	34	3
8	North-Western	38	59	19	27	32	28	25	28	25
9	Southern	13	67	49	7	28	46	54	0	7
10	Western	47	60	19	7	61	19	65	1	33
	Zambia (% Total)	35	70	41	9	37	32	55	17	9

Workforce

One of the biggest problems with the Zambian health sector is its lack of human resources. Zambia currently has half of the required and WHO recommended human resources for health workforce in every category. WHO attributes this to loss of substantial numbers of health workers to countries that offer better conditions of service, or to private institutions and Non-governmental Organizations that offer more appealing opportunities. [11]

Figure 14: Distribution of Health Workers from 2005-2010.

Occupational categories/cadres	2005/ 2006	2008*	2009	2010
Generalist medical practitioners	646	795	801	836
Specialist medical practitioners	-	-	-	-
Nursing professionals	6096	6691	7123	7461
Nursing associate professionals	-	-	-	-
Midwifery professionals	2273	2400	2374	2471
Midwifery associate professionals	-	-	-	-
Paramedical practitioners	1161	1161	1376	1462
Dentists	56	-	241	246
Dental assistants and therapists	-	-	-	-
Pharmacists	108	90	306	317
Pharmaceutical technicians and assistants	-	-	-	-
Environmental and occupational health & hygiene workers	803	948	1110	1130
Physiotherapists and physiotherapy assistants	86	-	191	206
Optometrists and opticians	-	-	-	-
Medical imaging and therapeutic equipment operators	142	-	226	228
Medical and pathology laboratory technicians	417	412	526	546
Medical and dental prosthetic technicians	-	-	-	-
• Community health workers* • Trained traditional birth attendant	4480 5332	3762 5215	-	-
Health management workers/Skilled administrative staff.	385	-	885	460
Other health support staff	11003	-	12365	12365
TOTAL	**23176**	-	**27524**	**27728**

Figure 15: Public/Private for Profit/Faith Based Organization/Private Not for Profit Distribution of Health Workers, 2007.

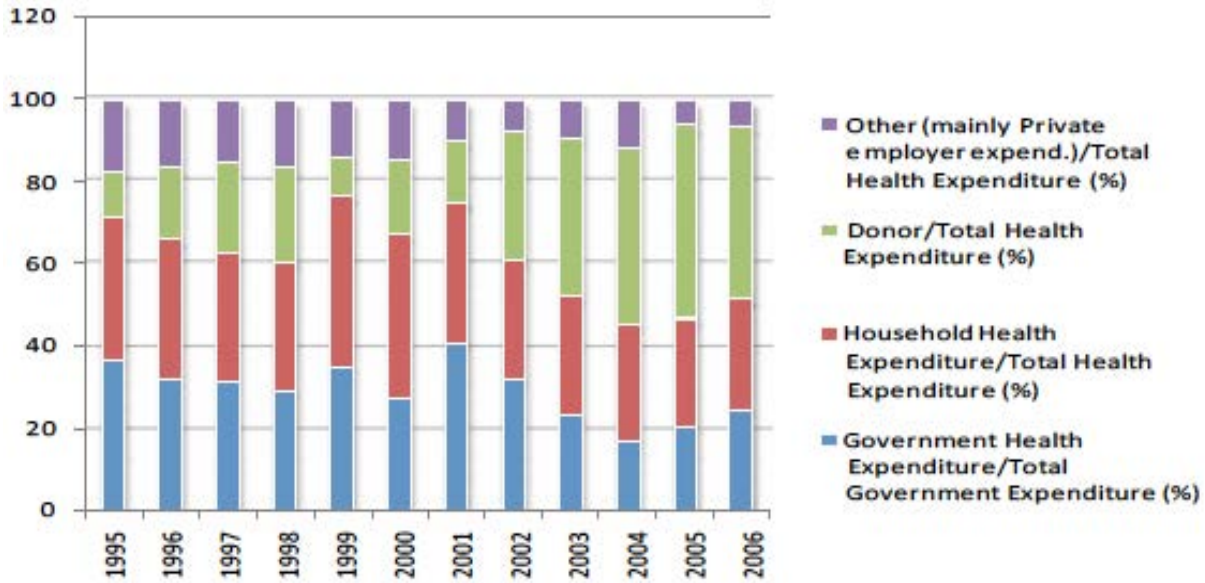
Occupational category/cadre	% Public sector	% Faith based organization	% private not-for – profit
Generalist medical practitioners	84.4	5.9	9.0
Nursing professionals	79.3	11.6	8.3
Paramedical practitioners	81.6	13.3	4.3
TOTAL (all health workers average)	**79.8**	**11.3**	**8.2**

Financing & Expenditures

According to the Zambian Ministry of Health National Health Strategic Plan 2011-2015, the financial resources for optimum health care are still far below necessary. Over the years there have been increases in the flow of funds to the health sector, but most have been in support of specific programs such as HIV/AIDS, malaria, and TB. [10] This has resulted in a reduction of government expenditure in the total health expenditure, and an increase in the donor component. Financing through the government is through the Ministry of Finance and National Planning. [5]

This chart shows the 2006 major sources of funding for the health sector. The primary source was external support, followed by households, government public expenditure, and other sources such as private sector schemes. [10]

Figure 16: Analysis of Sources of Income for the Health Sector

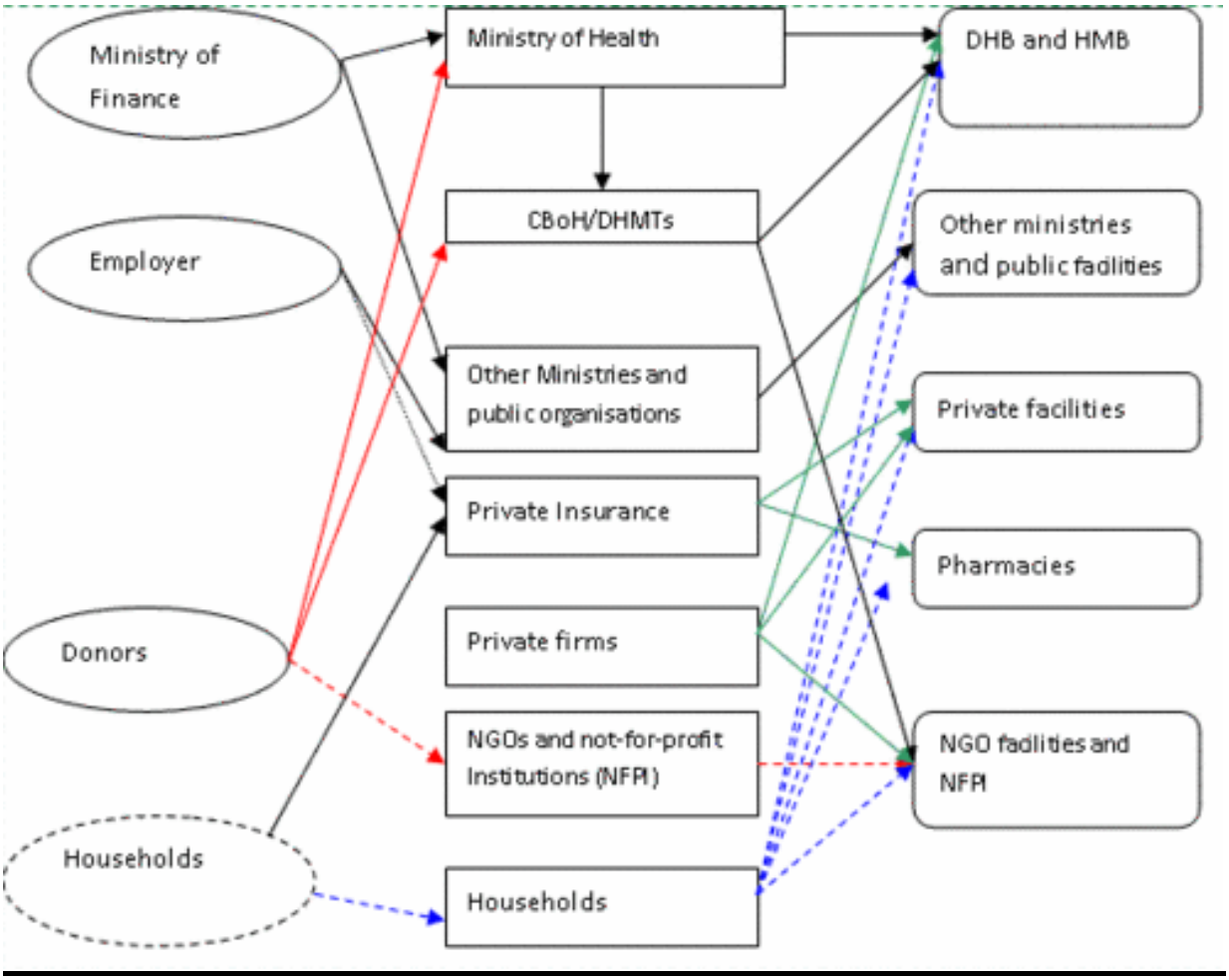


In 2011, the total expenditure on health was 6.1% of the GDP, while the general government expenditure on health as a percentage of total government expenditure was 16%. The private expenditure on health as a percentage of total expenditure on health was 40.2%. [3]

Key interventions in the country originate from the World Health Assembly (WHA) and Regional Committee (RC) policy documents, strategies, and resolutions. Specifically, these include: Implementation of International Regulations, Global Immunization Vision and Strategy, WHO HIV/AIDs Strategy 2011-2015, Cholera- Mechanism for Control and Prevention, Infant and Young child Nutrition Implementation Plan, Measles Elimination Strategy. Others include the Framework for African Public Health Emergency Fund, Poliomyelitis eradication, Disaster Risk Management, the Roadmap- for scaling up human resources 2012-2025, the Health Promotion Strategy, and many others. [3]

According to WHO, there is a strong donor presence in the Zambian healthcare sector. There is a Zambian Health Sector Wide Approach that is managed and preserved by an MoU agreement, which was signed by the government and its partners. Stakeholders in this agreement include the Ministry of Health, Ministry of Community Development/Mother and Child Health, and Civil Society Organizations. The UN also has a strong presence in Zambia. The UN Country Team supports the government's efforts towards achieving the long-term goals lined out in the approaches of Vision 2030, Sixth National Development Plan, and Delivering as One. [3]

Figure 17: Funding Flows in the Zambia Healthcare Sector



National Radiology Profile

A. Radiology Workforce

The WHO Human Resources for Health defines medical imaging and therapeutic equipment operators as those who: "test and operate radiographic, ultra sound, and other medical imaging equipment to produce images of body structures for the diagnosis and treatment of injury, disease, and other impairments". They may administer radiation treatments to patients under the supervision of a radiographer or other health professional. Examples include medical imaging technician, diagnostic medical radiographer, medical radiation therapist, magnetic resonance imaging technologist, nuclear medicine technologist, sonographer, and mammographer. Radiologists are classified as "specialist medical practitioners". According to the WHO Human Resources for Health, there were 228 medical imaging and therapeutic equipment operators in Zambia in 2010. This has increased significantly from 2005/2006, where there were only 142 medical imaging and therapeutic equipment operators. There is currently no data on the gender

distribution of these workers. The greatest percentages of these workers are located in the Lusaka, Copperbelt, and Southern provinces. [5]

Currently there are four radiologists working for the public health sector in Zambia. The University Teaching Hospital has four radiologists. One is a Zambian radiologist trained in South Africa; the others are foreign radiologists, two from China, and one from Ukraine. There are no sub-speciality radiologists in Zambia. Radiologists only read radiographs upon special request for consultation, because clinicians themselves read most radiographs. [13] There are no radiologists in the Western rural province. [14]

At the University Teaching Hospital in Lusaka, there are three maintenance staff and two students in the biomedical engineering department. [15] Most hospitals in Zambia have one "hospital engineer", responsible for the upkeep of medical equipment as well as other maintenance areas such as refrigeration, electrical, carpentry, and plumbing. [15]

Figure 18: The Ratio of Public Sector Physicians, Radiologists, and Radiographers 2003-2004

Staff	Number	Clients per staff member
Physicians	646	17,589
Radiologists	3	3,787,601
Radiographers	139	81,727

B. Training and Professional Reputation

The National Health Strategic Plan from the Zambian Ministry of Health cites that out of 29 academic institutions that offer training and education for healthcare personnel, only one institution offers a program in radiography. This program is at Evelyn Hone College, located in Lusaka under the Ministry of Technical and Vocational Education. [10] Students complete clinical training in conjunction with the University Teaching Hospital. The first class graduated in 1973, and the program has graduated about 450 radiographers since then. [14]

Figure 19: Number of entrants and graduates in the radiography program in Zambia between 2006-2009.

	2006	2007	2008	2009	Total
# Of entrants	No data	40	50	50	140
# Of graduates	32	38	43	23	136

Radiologists in Zambia must have completed a university level degree in basic medical education plus post-graduate clinical training in a medical specialization or equivalent. Medical imaging and therapeutic equipment operators are required to have formal training in medical technology, radiology, sonography, nuclear medical technology, or a related field. [5]

There are three medical schools in Zambia, two are public and one is private. Medical school requires 7 years of training after high school. After graduation from medical school, physicians complete 18 months of rotating internships in the core clinical

disciplines: medicine, surgery, obstetrics, gynecology, and pediatrics. Sub-specializations of radiology do not exist. Thus, the radiologists currently working in Zambia have trained in other countries. The primary medical training institution is at the University of Zambia School of Medicine in Lusaka. The other public medical school is Ndola School of Medicine, and is a branch of the University of Zambia. It is located in the Copperbelt province. The one private university, Apex Medical University, is located in Lusaka as well. There is no facility for specific radiologist training in Zambia. [16]

Currently there is no biomedical engineering technology program in Zambia. Thus, the qualifications and training of maintenance personnel vary within Zambia. Most hospitals in Zambia have one "hospital engineer" who is responsible for the upkeep of not only medical equipment, but also other maintenance areas. The University Teaching Hospital offers two to four weeks of induction training for new recruits, but most equipment training happens on the job. There is a severe lack of standardization of training. A curriculum for a three year diploma program in biomedical engineering technology at a Zambian technical college has been created and approved, so work is being done to address the shortage of qualified medical equipment maintenance personnel. [15]

Between 1996 and 2007, the governments of Zambia, Malawi, Ghana, and the Netherlands partnered with Fontys University to conduct healthcare personnel training programs, including radiographers. This was a national project that lasted two to six weeks. In Zambia, the courses offered were 15 'ultrasound for radiographers', 10 radiography refresher courses, curriculum review for radiography, and setting up a radiography and ultrasound skills laboratory. It was found that eighty-five percent of the participants were still working in their hospitals one year following the training. [17]

There is a Radiation Protection Board in Zambia, and their mission is to " provide effective and efficient regulatory and protection services to the members of the public, occupationally exposed workers, patients and the environment form harmful effects of ionising radiation". [10] It consists of a chairperson and 18 part time members appointed by the Minister. [18]

C. Equipment/Inventory Distribution

Figure 20: Number of Imaging Modalities Available in Zambia by Location

Modality	Number	Location	Public/Private
X-ray	7	Central Province	
	9	Copperbelt Province	
	5	Eastern Province	
	4	Luapula Province	
	6	Lusaka Province	
	6	Muchinga Province	
	4	Northern Province	
	10	North-Western Province	
	6	Southern Province	
	5	Western Province	
CT	5	Urban areas- University Teaching Hospital, Cancer Diseases Hospital, Maina Soko Military Hospital, Fairview Hospital in Lusaka, Nkhana Mine Hospital in Kitwe.	2 public, 3 private
MRI	2	Fairview Hospital in Lusaka and Nkhana Mine Hospital in Kitwe	2 private

Dr. Veronica Sichizya, a radiologist at University Teaching Hospital, provided data on existing radiology equipment at the facility in March 2015. They have 5 X-ray units: One digital chest x-ray unit for adults, one digital x-ray unit for peds, two bucky units, and two bucky x-ray units, and two fluoroscopy units. They have one CT scanner, which is a 128 multi-slice Toshiba. For ultrasound, they have 8 units, with only 4 being in good working condition. For nuclear medicine, they have one SPECT dual- head. They have no mammography or MRI, however, they have procured a catheterization machine which is soon to be installed. [20]

Mr. Foster Munsanje, with the Durban University of Technology, submitted a thesis for a Degree in Doctor of Technology: Radiography in September of 2013. He has a Master of Science degree in Radiography and a Master of Technology degree in Radiography. He conducted a study in the Western province of Zambia with the purpose of developing sustainable human capital developmental guidelines, embracing reliable advanced radiography practice. The study focused on radiological settings without a radiologist, thus serving most citizens up to remotest living conditions. [14]

Figure 21: Most Common X-Ray Examinations in a Month Preceding the Study

HOSPITAL S (numbered 1 to 11)	TYPE OF MOST COMMON X-RAY EXAMINATION	RATE OF MOST COMMON EXAMINATIONS	NUMBER OF ALL EXAMINATIONS IN A MONTH
1	Chest	280 *(77.7 %)*	360
2	Chest	220 *(83.9 %)*	262
3	Chest	1200 *(85.7 %)*	1400
4	Abdomen	90 *(75.0 %)*	120
5	Chest	120 (71.4 %)	168
6	Abdomen	70 (58.3 %)	120
7	Skeletal	80 *(66.7 %)*	120
8	Chest	167 *(69.3 %)*	241
9	Chest	92 (90.2 %)	102
10	Chest	167 *(68.2 %)*	245
11	Chest	89 (89.0 %)	100
TOTAL			**3238**

Mr. Munsanje argues that the biggest problem with radiology in Zambia is the lack of human resources. The lack of standardization among radiologic technologists, along with the high demand for exams and increased job scope create major challenges in the delivery of successful medical imaging. His study showed that "the development of advanced competencies or extended roles amongst radiographers could play a significant role towards the reduction of persistent radiological service gaps in the Zambia context. Importantly, it was reported that the current meager staffing levels within radiology departments in the rural Western province do not allow for regular staff development participation by the radiographers working in these units. This disparity, coupled with a lack of radiologists as well as an inadequate basic level of education for radiographers, has led to compromise of radiographic competencies and/or radiological service delivery in rural areas. Hence, there would appear to be an urgent need for revision of the education and training offered to radiographers, as well as review of those policies that relate to licensing of practice and use of related radiological equipment and infrastructural provisions to sustain rural healthcare settings." He developed a conceptual framework and guidelines to help solve the problem. [14]

D. Regulation/Policy

Zambian government published Statue 163, Chapter 311: Ionizing Radiation Protection Act, on October 7th, 2005. The purpose is "to establish the Radiation Protection Authority and to define its functions and powers; to provide for the protection of the public, workers and the environment from hazards arising from the use of devices or materials capable of producing ionizing radiation; to repeal and replace the Ionizing Radiation Act, 1972; and to provide for matters connected with or incidental to the foregoing". [18]

Conclusion

In summary, the major challenges for the health in Zambia include; a high incidence of communicable diseases, rising incidence of non-communicable diseases, a weak health system, insufficient human resources, inadequate financing, shortages of essential supplies and equipment, high poverty levels, and a large land area that limits the provision of services from being close to communities in rural areas. [3]

The small amount of literature published makes it difficult to pinpoint exact challenges faced by the radiology sector in Zambia. However, it can be broadly concluded that the limited availability of education and training of health care staff, availability and accessibility of radiological services, and lack of human resources all contribute to a system in that is unable to meet the demands of the nation.

Resources

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